CLAIMS

1. A waveguide structure comprising a sensing layer of a medium disposed upon a second layer, said second layer being disposed upon a third layer of differing refractive index to the second layer, in which the structure is capable of supporting a bulk optical mode in the second layer, the medium is adapted to trap a target particle that results in a change in an optical property of the sensing layer and the thickness and/or refractive index of the second layer is selected to control the depth of penetration of the optical mode into the sensing layer and to overlap at least a major portion of the particle.

2. A waveguide structure according to Claim 1, further comprising a highly reflective fourth layer disposed between the second layer and the third layer.

3. A waveguide structure according to Claim 1 or Claim 2, in which the third layer has refractive index higher than the second layer.

4. A waveguide structure according to Claim 3, in which the second layer has refractive index ranging from 1.33 to 1.45.

5. A waveguide structure according to any preceding Claim, in which the thickness of the second layer ranges from 300 nm to 500 nm.

6. A waveguide structure according to any preceding Claim, in which the second layer comprises silica, an agarose gel, a fluorinated polymer or a polyacrylate.

7. A waveguide structure according to any preceding Claim, in which the fourth layer comprises a metal or solid dye material.

8. A waveguide structure according to any of Claim dependent on Claim 2, in which the metal comprises zirconium, chromium, aluminium, tantalum or titanium.

9. An optical sensor comprising the waveguide structure of any of Claims 1 to 8, an optical source, means for coupling light from the optical source into the optical mode and means for detecting light scattered or emitted by a particle in the sensing medium.

10. An optical sensor according to Claim 9, further comprising means for detecting changes in the properties of the optical mode by monitoring properties of light coupled from the waveguide structure.

11. An optical sensor according to Claim 8 or Claim 9, in which the particle is a bacterium ranging in diameter from 1 to 10 μm.

12. An optical sensor according to any of Claims 9 to 11, in which the wavelength of light emitted by the optical source is 488 nm or 635 nm.

13. A waveguide structure substantially as hereinbefore described with reference to and as shown in Figures 3 to 12 of the accompanying drawings.

14. An optical sensor substantially as hereinbefore described with reference to and as shown in Figures 5 to 12 of the accompanying drawings.